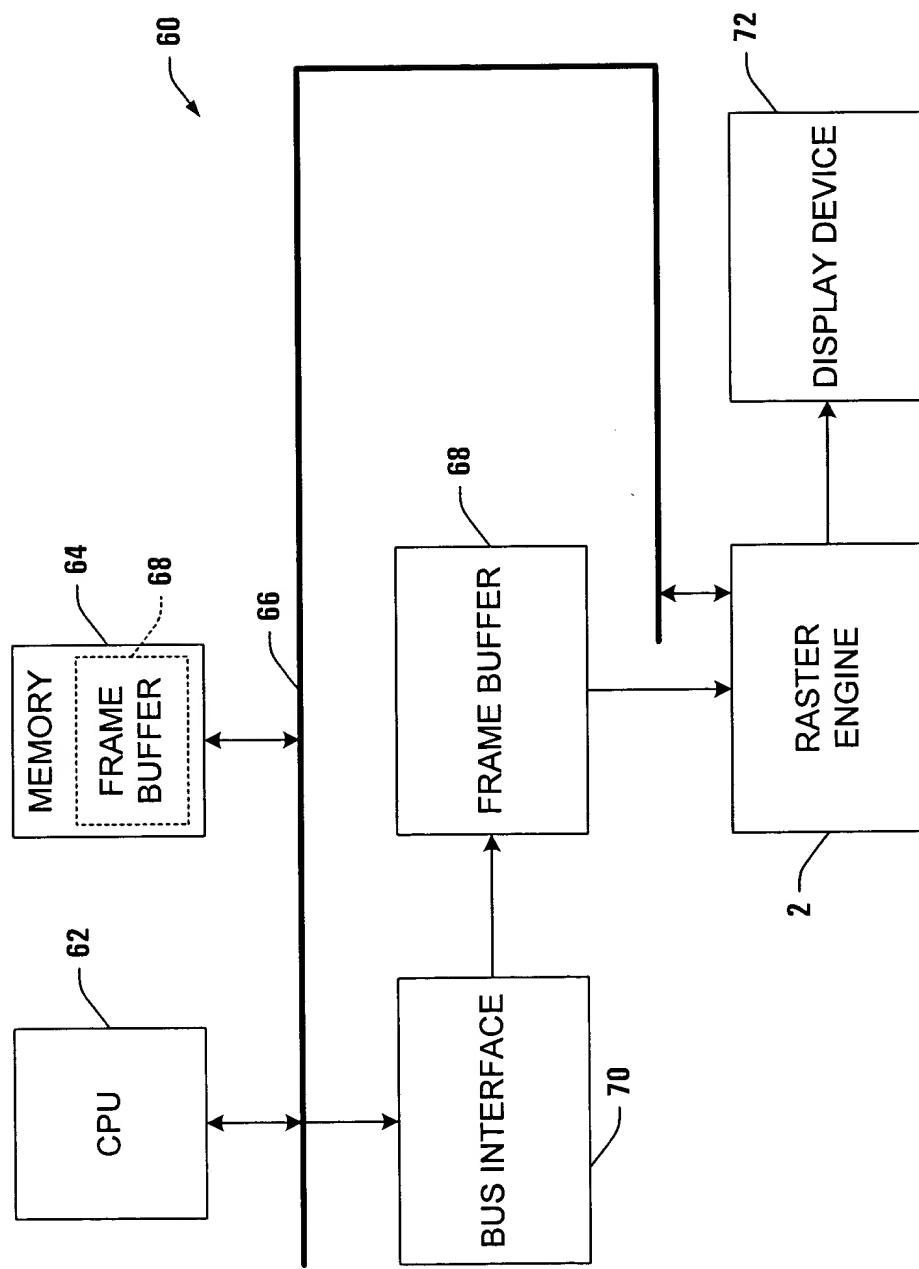
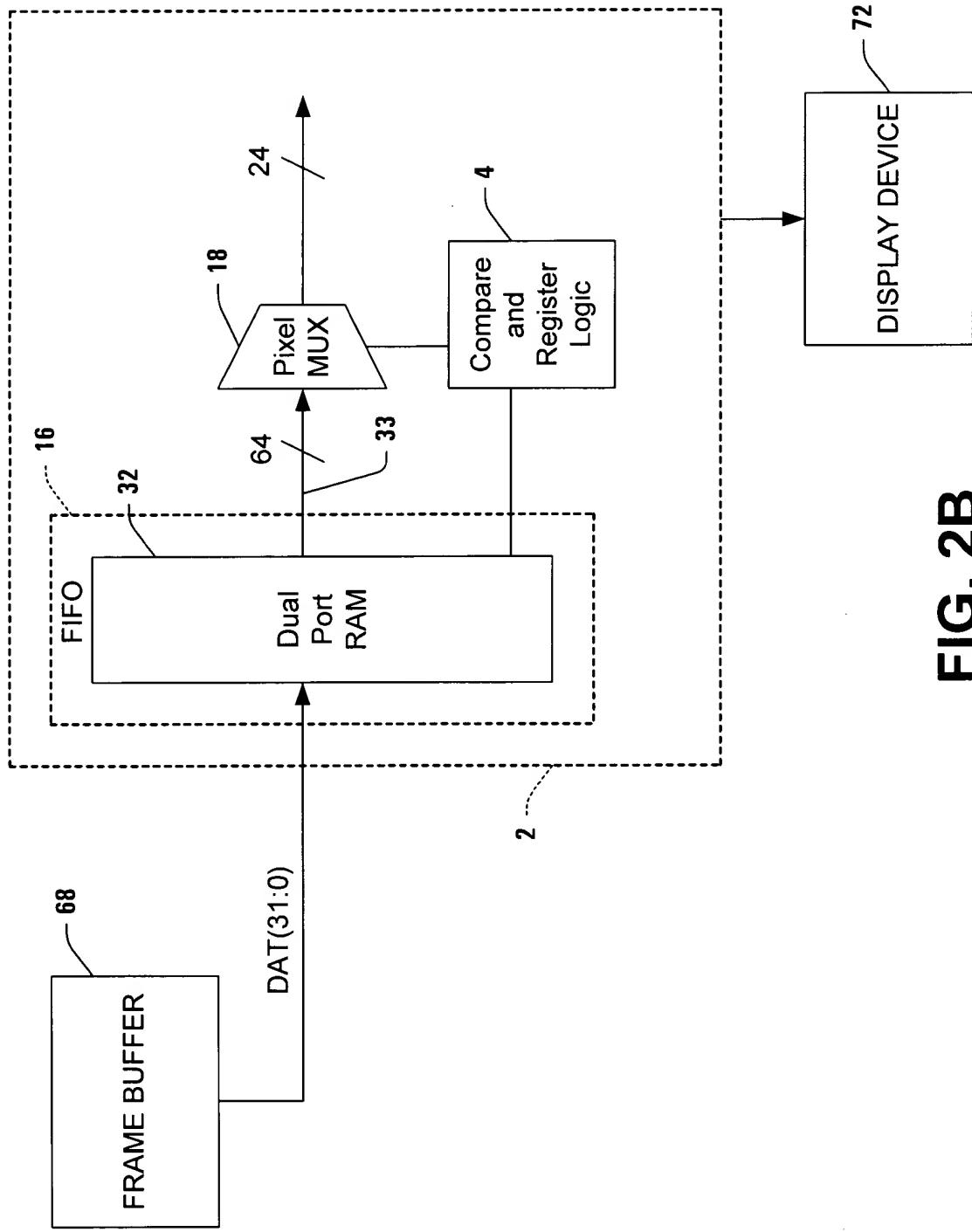


**FIG. 1**



**FIG. 2A**



**FIG. 2B**

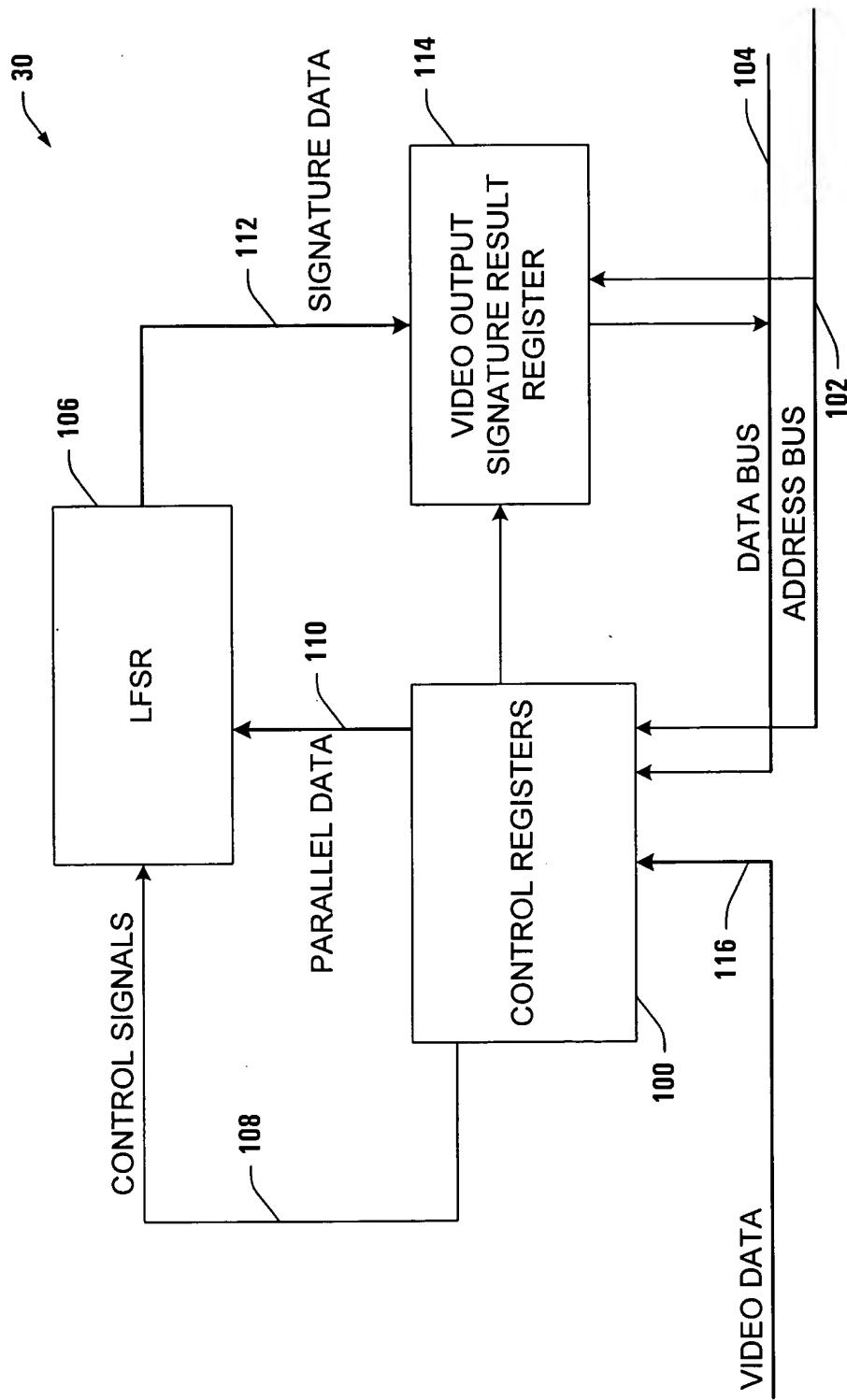


FIG. 3

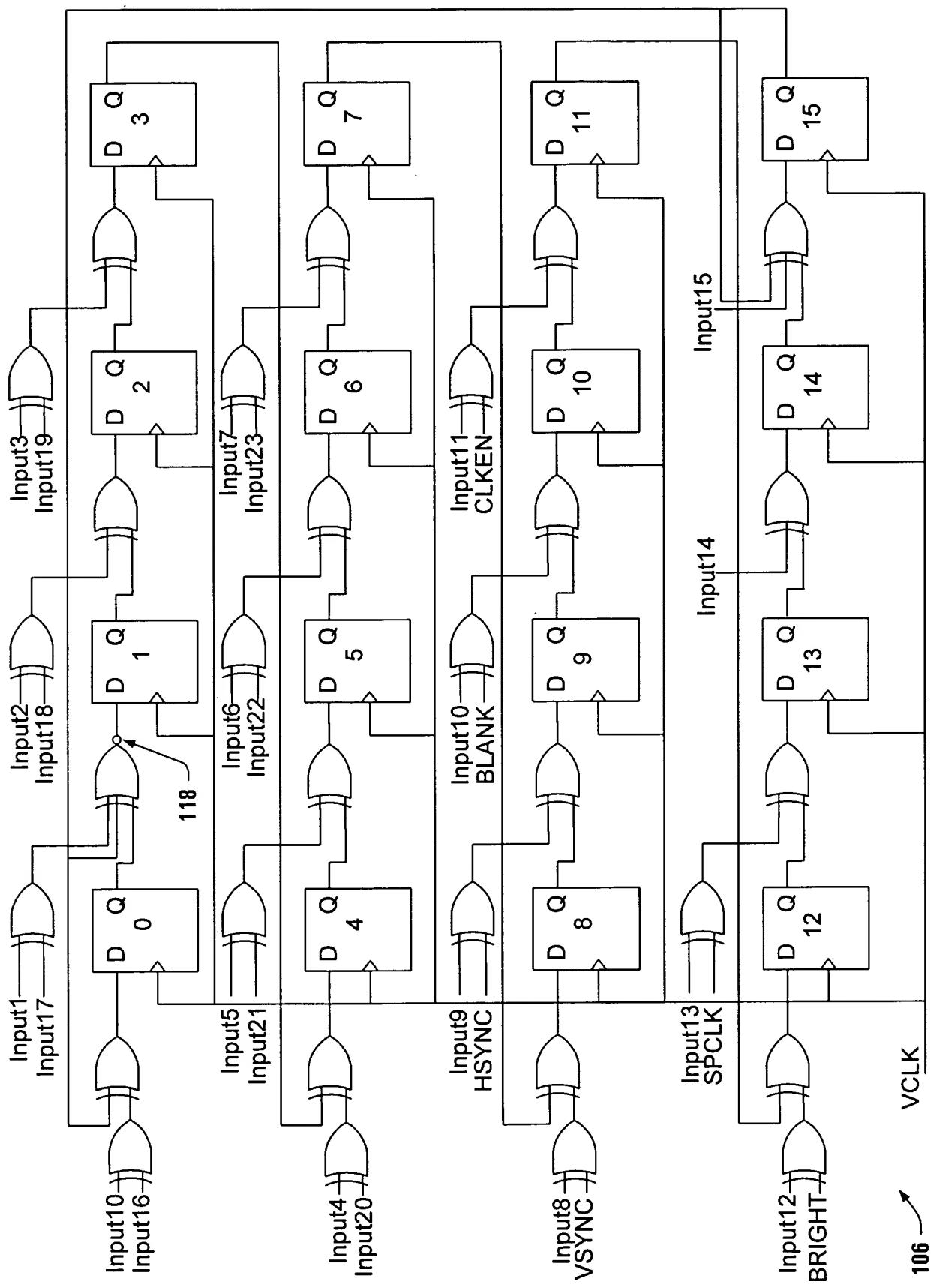
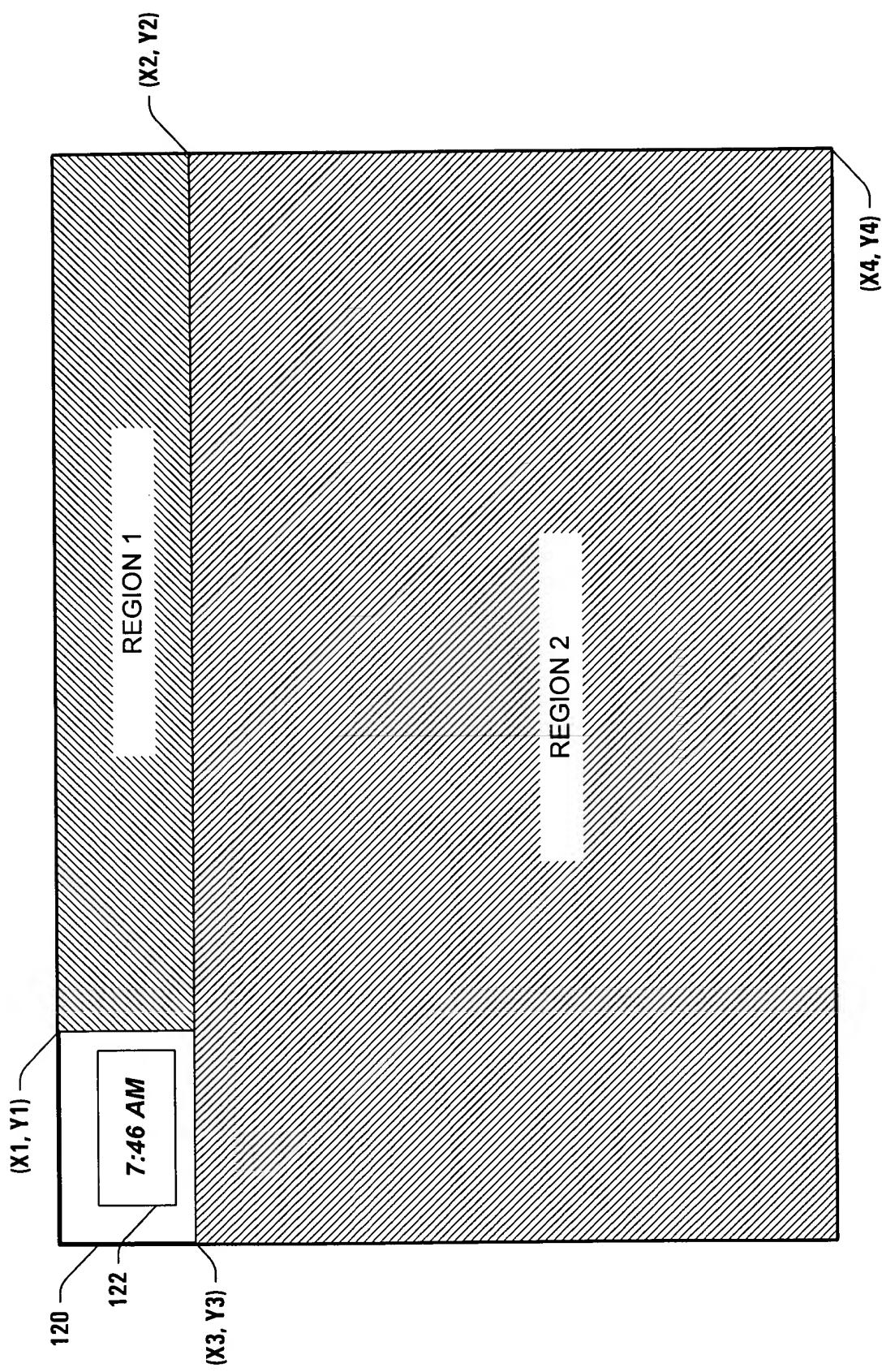


FIG. 4



**FIG. 5**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

SIGVAL

130 →

**FIG. 6A**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
EN	RSVD	SPCLK	BRIGHT	CLKEN	BLANK	HSYNC	VSYNC	PEN							
PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN	PEN

SIGCTL

132 →

**FIG. 6B**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD	RSVD	RSVD	RSVD	RSVD	STOP <sub>10</sub>	STOP <sub>9</sub>	STOP <sub>8</sub>	STOP <sub>7</sub>	STOP <sub>6</sub>	STOP <sub>5</sub>	STOP <sub>4</sub>	STOP <sub>3</sub>	STOP <sub>2</sub>	STOP <sub>1</sub>	STOP <sub>0</sub>
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

RSVD	RSVD	RSVD	RSVD	START <sub>10</sub>	START <sub>9</sub>	START <sub>8</sub>	START <sub>7</sub>	START <sub>6</sub>	START <sub>5</sub>	START <sub>4</sub>	START <sub>3</sub>	START <sub>2</sub>	START <sub>1</sub>	START <sub>0</sub>	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

VSIGSTRSTOP

134 →

**FIG. 6C**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	STOP 10	STOP 9	STOP 8	STOP 7	STOP 6	STOP 5	STOP 4	STOP 3	STOP 2	STOP 1	STOP 0

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	START 10	START 9	START 8	START 7	START 6	START 5	START 4	START 3	START 2	START 1	START 0

HSIGSTRTSTOP

136 →

**FIG. 6D**

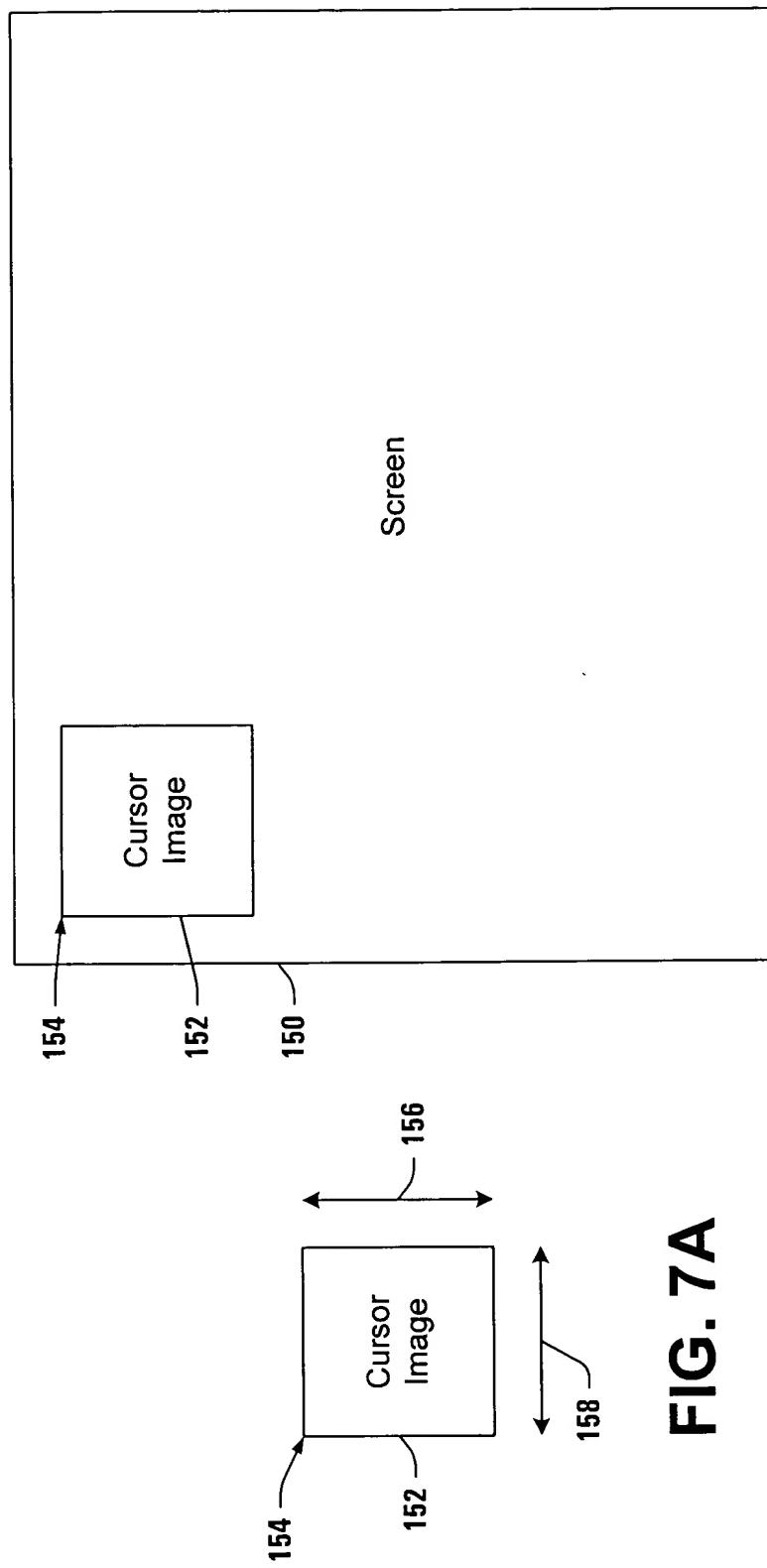
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	VCLR 10	VCLR 9	VCLR 8	VCLR 7	VCLR 6	VCLR 5	VCLR 4	VCLR 3	VCLR 2	VCLR 1	VCLR 0

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	HCLR 10	HCLR 9	HCLR 8	HCLR 7	HCLR 6	HCLR 5	HCLR 4	HCLR 3	HCLR 2	HCLR 1	HCLR 0

SIGCLR

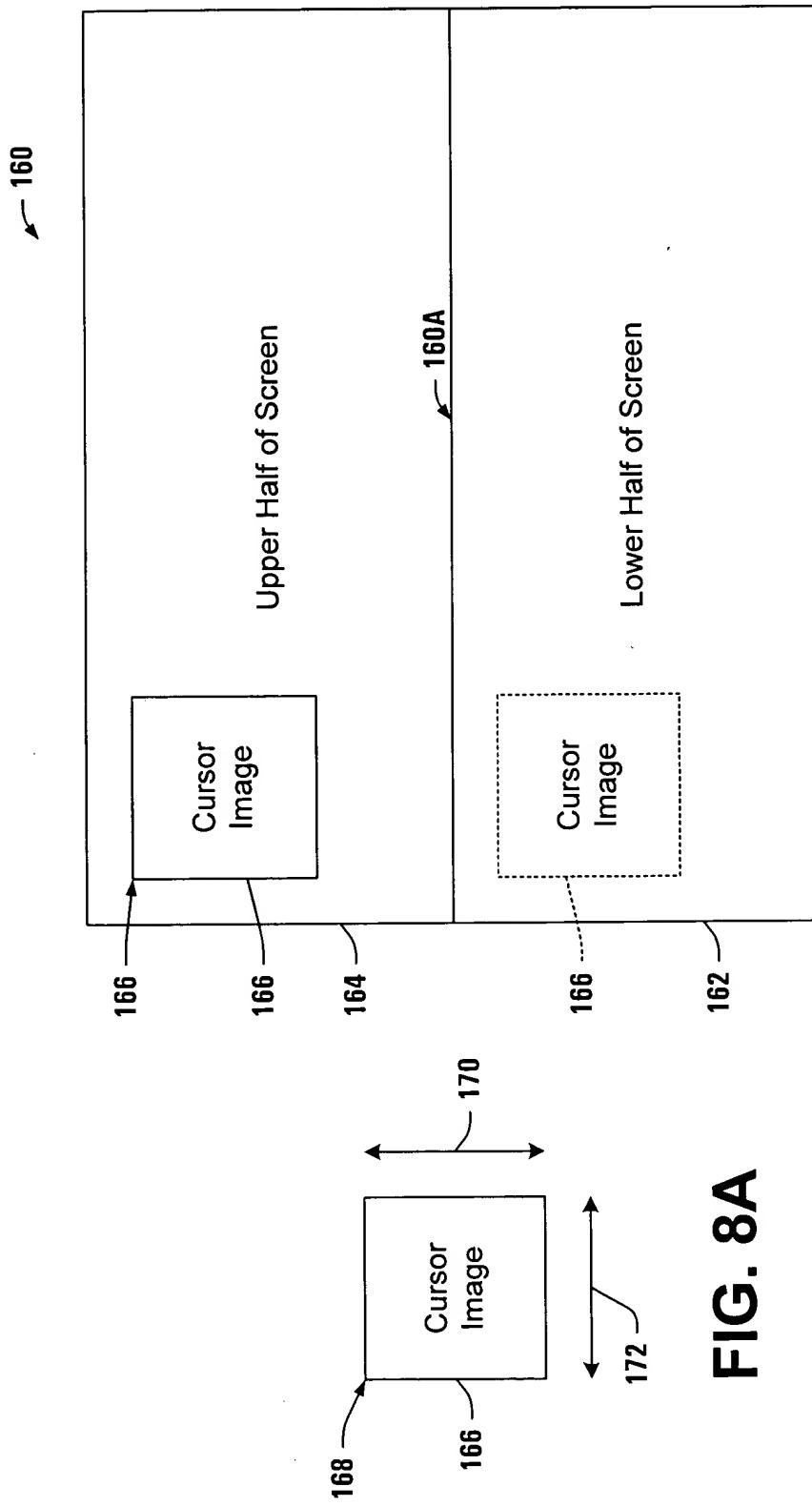
138 →

**FIG. 6E**



**FIG. 7A**

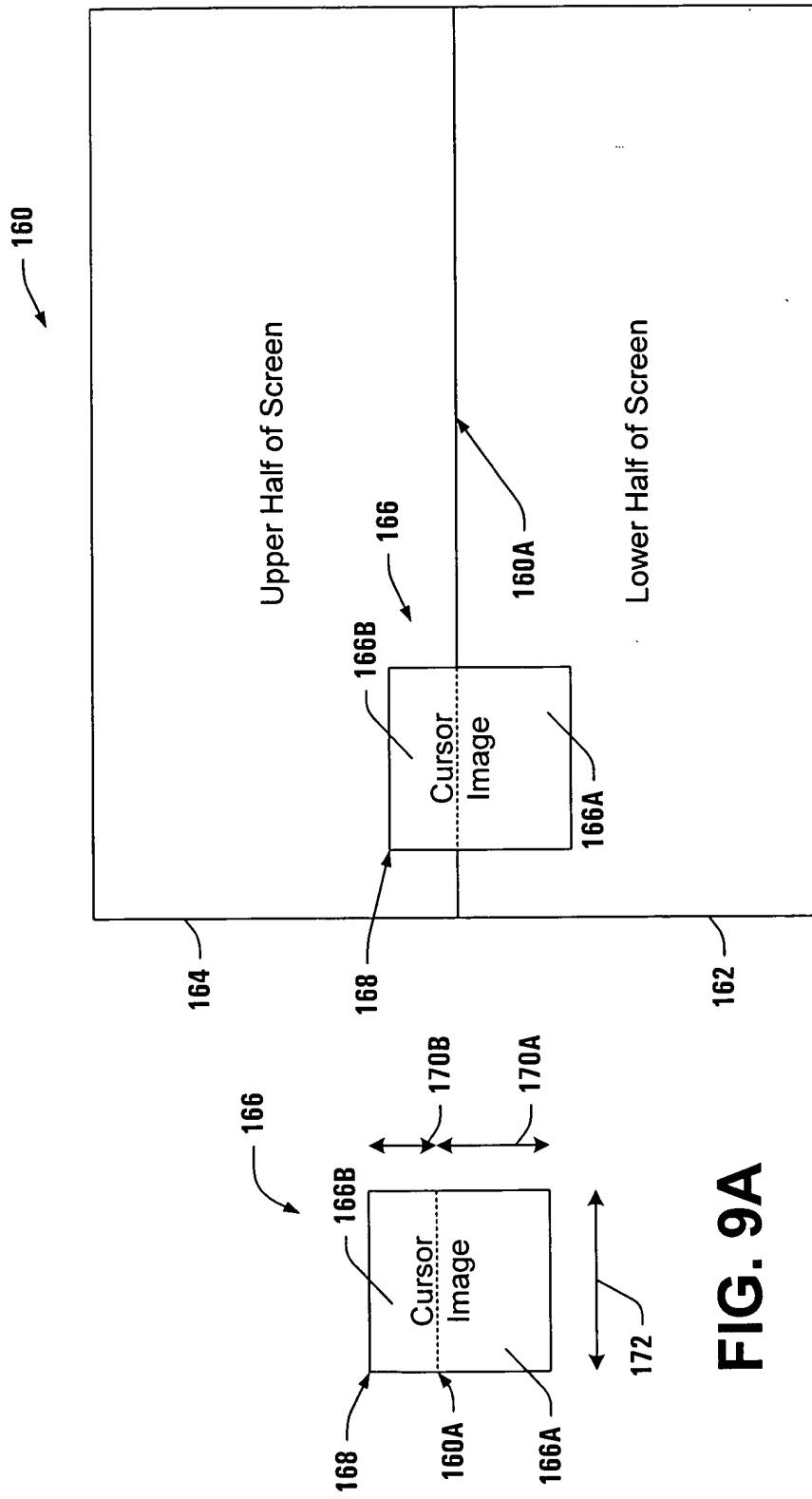
**FIG. 7B**



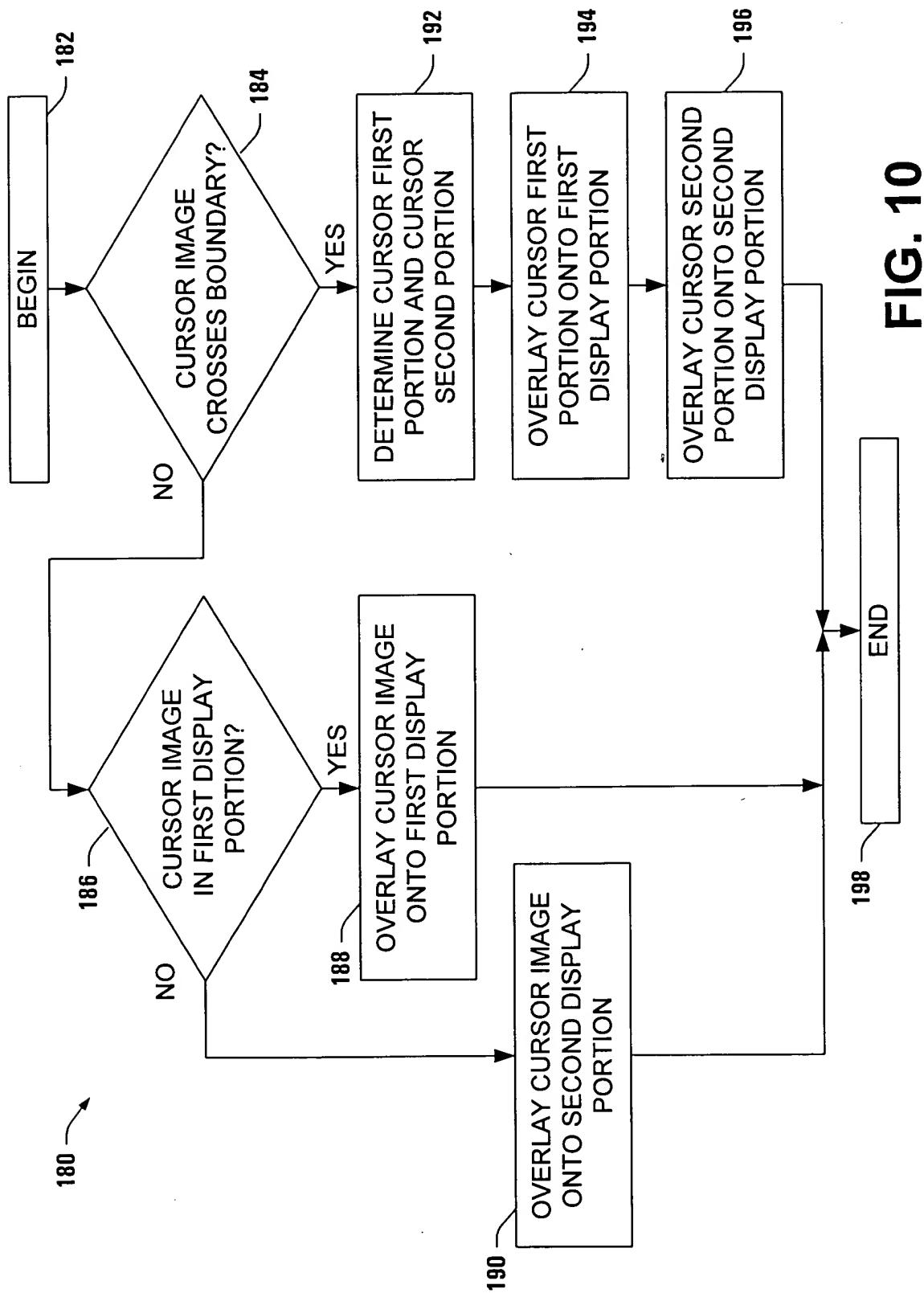
**FIG. 8A**

**FIG. 8B**

**FIG. 9A**



**FIG. 9B**



**FIG. 10**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
ADR															

CURSOR\_ADDR\_START

200 →

**FIG. 11A**

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ADR															

CURSOR\_ADDR\_START

202 →

**FIG. 11B**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
ADR															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ADR															

CURSOR\_ADDR\_RESET

202 →

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DLNS5	DLNS4	DLNS3	DLNS2	DLNS1	DLNS0	CSTEP 0	CSTEP 1	CSTEP 0	CLNS5	CLNS4	CLNS3	CLNS2	CLNS1	CLNS0	CLNS1

CURORSIZE

204 →

**FIG. 11C**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
COLO R															

CURSORCOLOR1  
CURSORCOLOR2  
CURSORLINK1  
CURSORLINK2

206 →

**FIG. 11D**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	YLOC <sub>10</sub>	YLOC <sub>9</sub>	YLOC <sub>8</sub>	YLOC <sub>7</sub>	YLOC <sub>6</sub>	YLOC <sub>5</sub>	YLOC <sub>4</sub>	YLOC <sub>3</sub>	YLOC <sub>2</sub>	YLOC <sub>1</sub>	YLOC <sub>0</sub>

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
CEN	RSVD	RSVD	RSVD	RSVD	RSVD	XLOC <sub>10</sub>	XLOC <sub>9</sub>	XLOC <sub>8</sub>	XLOC <sub>7</sub>	XLOC <sub>6</sub>	XLOC <sub>5</sub>	XLOC <sub>4</sub>	XLOC <sub>3</sub>	XLOC <sub>2</sub>	XLOC <sub>1</sub>	XLOC <sub>0</sub>

CURSOR\_XYLOC

208 →

FIG. 11E

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
RSVD																

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
CLHEN	RSVD	RSVD	RSVD	RSVD	RSVD	YLOC <sub>10</sub>	YLOC <sub>9</sub>	YLOC <sub>8</sub>	YLOC <sub>7</sub>	YLOC <sub>6</sub>	YLOC <sub>5</sub>	YLOC <sub>4</sub>	YLOC <sub>3</sub>	YLOC <sub>2</sub>	YLOC <sub>1</sub>	YLOC <sub>0</sub>

CURSOR\_DHSCAN\_LH\_YLOC

210 →

FIG. 11F

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

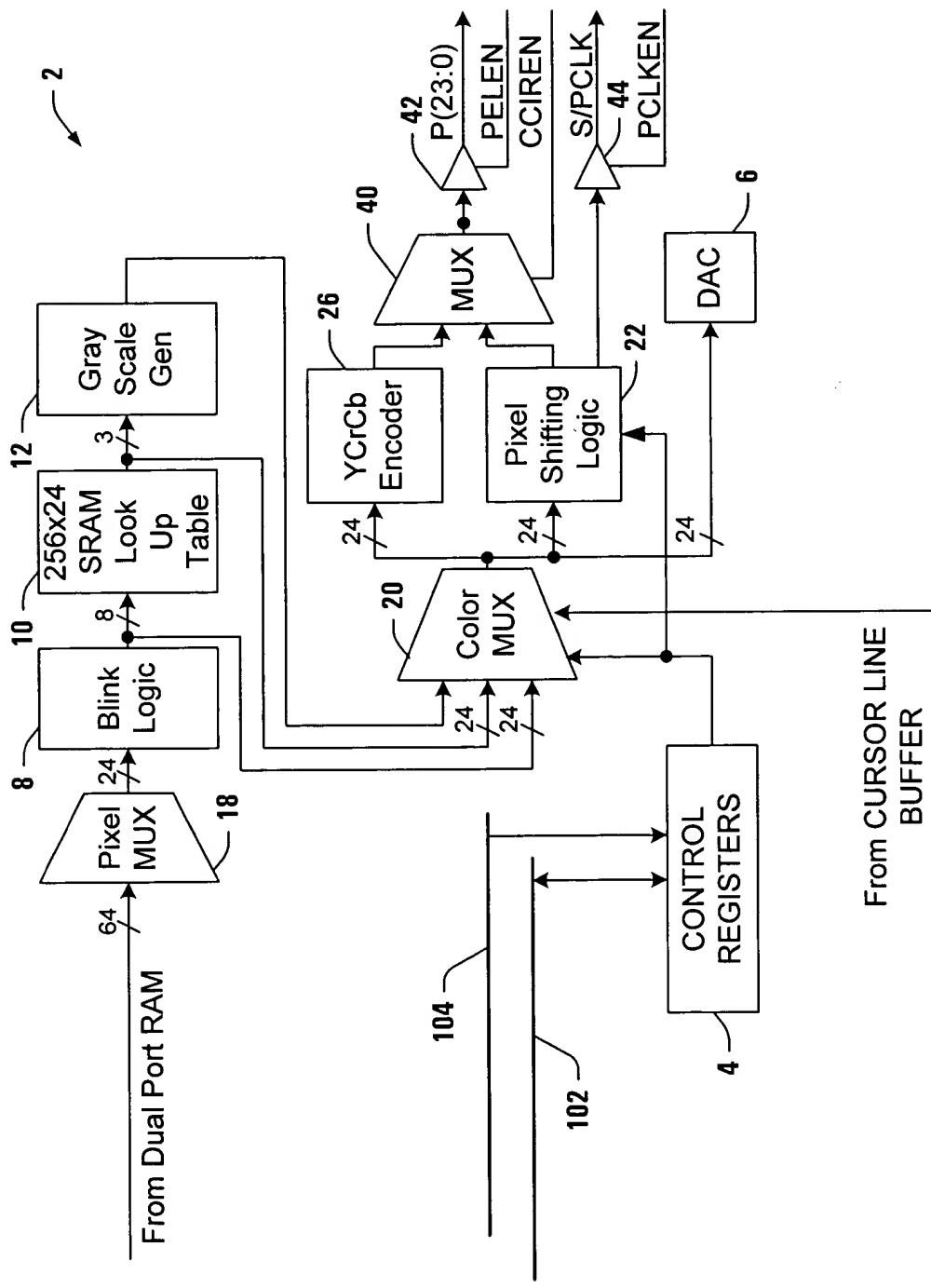
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RSVD															

CURSORLINK

212 →

**FIG. 11G**

**FIG. 12**



31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

PIXELMODE

230 →

**FIG. 13A**

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RSVD	DSCA	C3	C2	C1	C0	M3	M2	M1	M0	S2	S1	S0	P2	P1	P0

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RSVD															

PARLLIFOOUT

232 →

**FIG. 13B**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16		
RSVD	ESTR T3	ESTR T2	ESTR T1	ESTR T0	CNT3	CNT2	CNT1	CNT0									

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
RSVD	DAT															

PARLLIFIN

## FIG. 13C

shift	color	output mode	P(23)	P(22)	P(21)	P(20)	P(19)	P(18)	P(17)	P(16)	P(15)	P(14)	P(13)	P(12)	P(11)	P(10)	P(9)	P(8)	P(7)	P(6)	P(5)	P(4)	P(3)	P(2)	P(1)	P(0)			
mode	mode	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***			
0x0	0x0 0x4	single pixel per clock up to 24 bits wide	P(23)	P(22)	P(21)	P(20)	P(19)	P(18)	P(17)	P(16)	P(15)	P(14)	P(13)	P(12)	P(11)	P(10)	P(9)	P(8)	P(7)	P(6)	P(5)	B(4)	P(3)	P(2)	P(1)	P(0)			
0x8	0x0	single 16-bit 565 pixel per clock	R(7)	R(6)	R(5)	R(4)	R(3)	R(2)	R(1)	R(0)	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)	R(7)	R(8)	R(9)	R(10)	R(11)	R(12)	R(13)	R(14)	R(15)	R(16)			
0x0	0x0 0x5	single 16-bit 565 pixel per clock	R(4)	R(3)	R(2)	R(1)	R(0)	R(4)	R(3)	R(2)	R(1)	R(0)	R(3)	R(2)	R(1)	R(0)	R(4)	R(3)	R(2)	R(1)	R(0)	R(1)	R(2)	R(3)	R(4)	R(5)			
0x0	0x6	single 16-bit 555 pixel per clock	R(4)	R(3)	R(2)	R(1)	R(0)	R(4)	R(3)	R(2)	R(1)	R(0)	R(3)	R(2)	R(1)	R(0)	R(4)	R(3)	R(2)	R(1)	R(0)	R(1)	R(2)	R(3)	R(4)	R(5)			
0x1	0x0 0x4	single 24 bit pixel on 18 lines	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
0x1	0x5	single 16-bit 565 pixel on 18 lines	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
0x1	0x6	single 16-bit 555 pixel on 18 lines	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
0x2	0x0	progressive scan	P(20)	P(19)	P(18)	P(17)	P(16)	P(15)	P(14)	P(13)	P(12)	P(11)	P(10)	P(9)	P(8)	P(7)	P(6)	P(5)	P(4)	P(3)	P(2)	P(1)	P(0)	P(1)	P(2)	P(3)			
0x8	0x0	2 pixels per shift clock	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *			
		dual scan																											
		Lower	Lower	Upper																									
		P(20)	P(19)	P(18)	P(17)	P(16)	P(15)	P(14)	P(13)	P(12)	P(11)	P(10)	P(9)	P(8)	P(7)	P(6)	P(5)	P(4)	P(3)	P(2)	P(1)	P(0)	P(1)	P(2)	P(3)	P(4)			
		R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *	B(4) *	R(4) *	G(4) *		
0x3	0x0	progressive scan	P3(6)	P2(6)	P1(6)	P0(6)	P3(5)	P2(5)	P1(5)	P0(5)	P3(4)	P2(4)	P1(4)	P0(4)	P3(3)	P2(3)	P1(3)	P0(3)	P2(2)	P1(2)	P0(2)	P1(1)	P0(1)	P2(22)	P1(21)	P0(20)	P1(19)	P0(18)	
0x8	0x0	4 pixels per shift clock	G3(6) *	B3(6) *	B2(6) *	B1(6) *	G3(6) *	B3(6) *	B2(6) *	B1(6) *	G3(6) *	B3(6) *	B2(6) *	B1(6) *	G3(7) *	B3(7) *	B2(7) *	B1(7) *	R1(7) *	R1(6) *	R1(5) *	R1(4) *	R1(3) *	R1(2) *	R1(1) *	R1(0) *	R1(15) *	R1(14) *	R1(13) *
		dual scan																											
		Lower	Lower	Upper	Upper																								
		P1(14)	P1(13)	P1(12)	P1(11)	P1(10)	P1(9)	P1(8)	P1(7)	P1(6)	P1(5)	P1(4)	P1(3)	P1(2)	P1(1)	P1(0)	P1(15)	P1(14)	P1(13)	P1(12)	P1(11)	P1(10)	P1(9)	P1(8)	P1(7)	P1(6)	P1(5)	P1(4)	
		P1(6)	P1(5)	P1(4)	P0(6)	P0(5)	P0(4)	P0(3)	P0(2)	P0(1)	P0(0)	P0(1)	P0(0)	P0(1)	P0(2)	P0(3)	P0(4)	P0(5)	P0(6)	P0(7)	P0(8)	P0(9)	P0(10)	P0(11)	P0(12)	P0(13)	P0(14)	P0(15)	P0(16)

• These bits are an ORed combination of the bit value shown and the next significant bit below (This rounds the color value to nearest color).

These bits do not get a substitute and are defined to the values controlled by the pixel output mode in the upper part of the table.

\*\*\* These birds are pinned out in certain variants only since until now great numbers have not been collected.

These bits are pinned out in certain variants only.

FIG. 14B

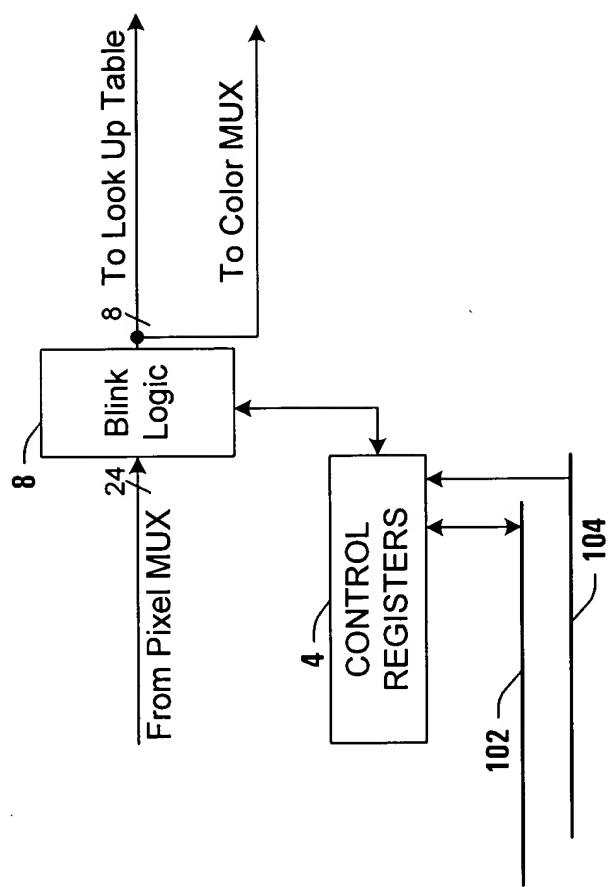


FIG. 15

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

BLINKRATE

250 →

**FIG. 16A**

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RSVD															

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
MASK															

BLINKMASK

252 →

**FIG. 16B**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

BLINKPATRN

254 →

**FIG. 16C**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
P MASK															

PATTERNMASK

256 →

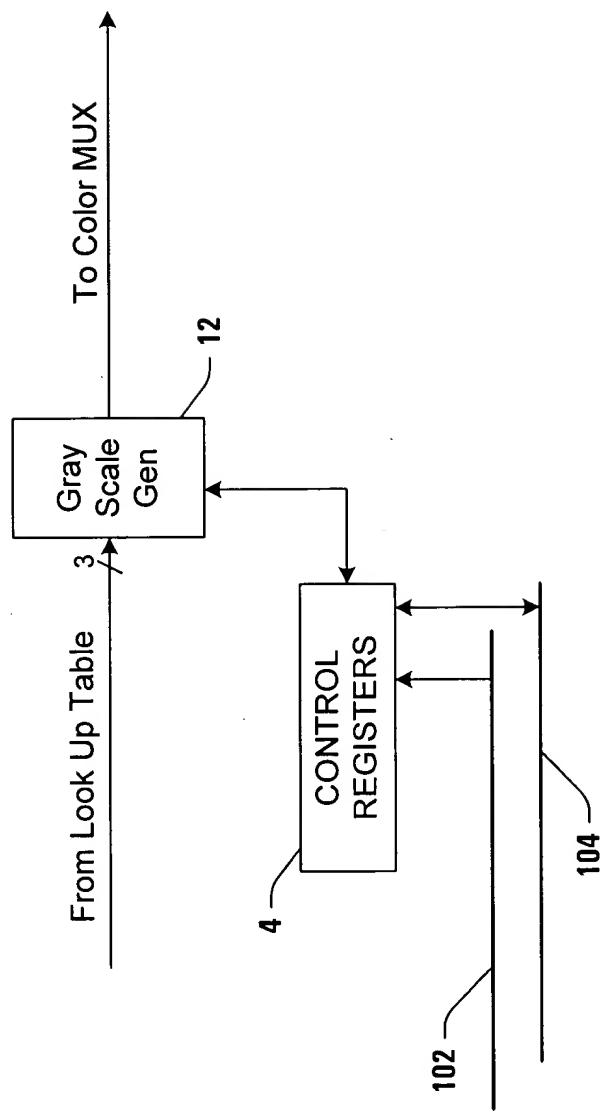
**FIG. 16D**

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD															
BGOFF															

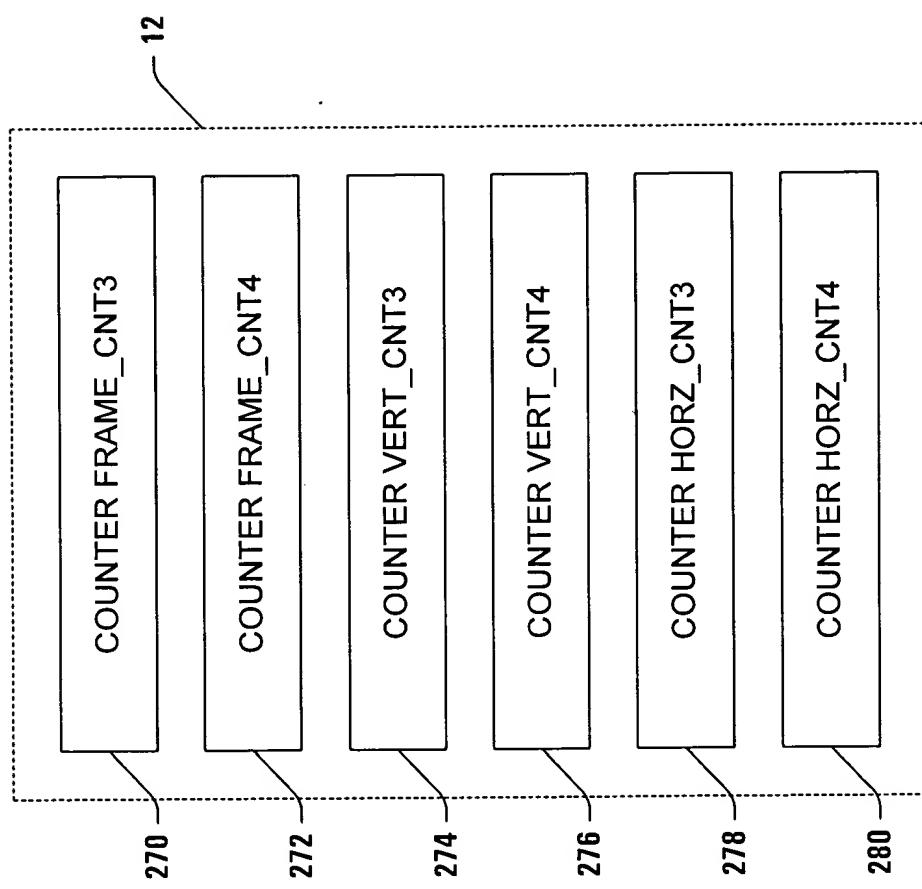
BG\_OFFSET

**FIG. 16E**

FIG. 17



**FIG. 18**



31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSVD	HORZ														

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

GRAYSCALE LUT

282 →

**FIG. 19**



FRAME	Vert	Horz	Cir	HCNT (pixels)	11	11	11	10	10	10	01	01	01	00	00	00	00	00	GSLLUT Address *4
Cir					11	10	01	00	11	10	01	00	11	10	01	00	00	00	
D18			D16		D15	D13	D14	D10	D11	D12	D9	D8	D7	D6	D5	D4	D3	D2	01
X	X	X		register address	0	0	0	0	0	0	0	0	0	0	0	0	0	0	000
			base + 0x80		0	0	0	0	0	0	0	0	0	0	0	0	0	0	000
			base + 0xA0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	000
			base + 0xC0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	000
			base + 0xE0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	000
X	X	X	base + 0x9C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	111
			base + 0xBC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	111
			base + 0xDC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	111
			base + 0xFC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	111

FIG. 21

302

304 →

FRAME 0	V	H	O	R	Z
	1	1	1	1	
E	1	1	1	1	
R	1	1	1	1	
T	1	1	1	1	

FRAME 1	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0

FRAME 3	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0

FRAME 2	1	1	1	1	1
	1	1	1	1	1
	1	1	1	1	1
	1	1	1	1	1
	1	1	1	1	1

FIG. 22

306 →

FRAME 0	V	H	O	R	Z
E	1	0	1	0	
R	1	0	1	0	
T	1	0	1	0	

FRAME 1

0	1	0	1
0	1	0	1
0	1	0	1
0	1	0	1

FRAME 2

1	0	1	0
1	0	1	0
1	0	1	0
1	0	1	0

FRAME 3

0	1	0	1
0	1	0	1
0	1	0	1
0	1	0	1

FIG. 23

308 →

FRAME 0	V	H	O	R	Z
E	1	0	1	0	
R	0	0	1	1	
T	1	0	1	0	

FRAME 1	0	0	1	1
	0	1	0	1
	1	1	0	0
	0	1	0	1

FRAME 1

1	0	1	0	0
1	1	0	0	1
1	0	1	0	1
0	0	1	1	1

FRAME 2

0	1	0	1
0	0	1	1
0	1	0	1
1	1	0	0

FRAME 3

**FIG. 24**

FRAME	Vert	Horz	VCNT (lines)	11	11	11	11	10	10	01	01	01	00	00	00	00	GSU1T Address '4'
Ctr	Ctr	Ctr	HCNT (pixels)	11	10	01	00	11	10	01	00	11	10	01	00	00	Pixel
D1B	D17	D16	register address	015	014	013	012	011	010	08	07	06	05	04	03	02	FRAME
1	1	1	base + 0x8C	0	1	0	1	0	0	0	1	0	1	0	1	0	Value
			base + 0xAAC	-	0	1	0	0	1	1	0	1	0	1	0	0	011
			base + 0xCC	1	1	0	0	0	1	0	0	1	1	0	1	10	011
			base + 0xEC	0	0	1	1	0	1	0	1	0	0	1	0	11	011

FIG. 25

312 → H O R Z

FRAME 0

V	1	0	0
E	0	1	0
R	0	0	1

T

FRAME 1

0	1	0
0	0	1
1	0	0

FRAME 2

0	0	1
1	0	0
0	1	0

FIG. 26

314 → H O R Z

FRAME 0	V	1	0	0
E	0	0	1	
R	0	1	0	

T

FRAME 1

0	1	0
0	1	0
0	0	1

FRAME 2

0	0	1
1	0	0
1	0	0

FIG. 27

**FIG. 28**

318 → H O R Z

FRAME 0	V	1	0	0	0
E	0	0	1	1	
R	0	1	0	0	
T					

FRAME 1

0	1	0	0
0	1	0	0
0	0	1	1

FRAME 2

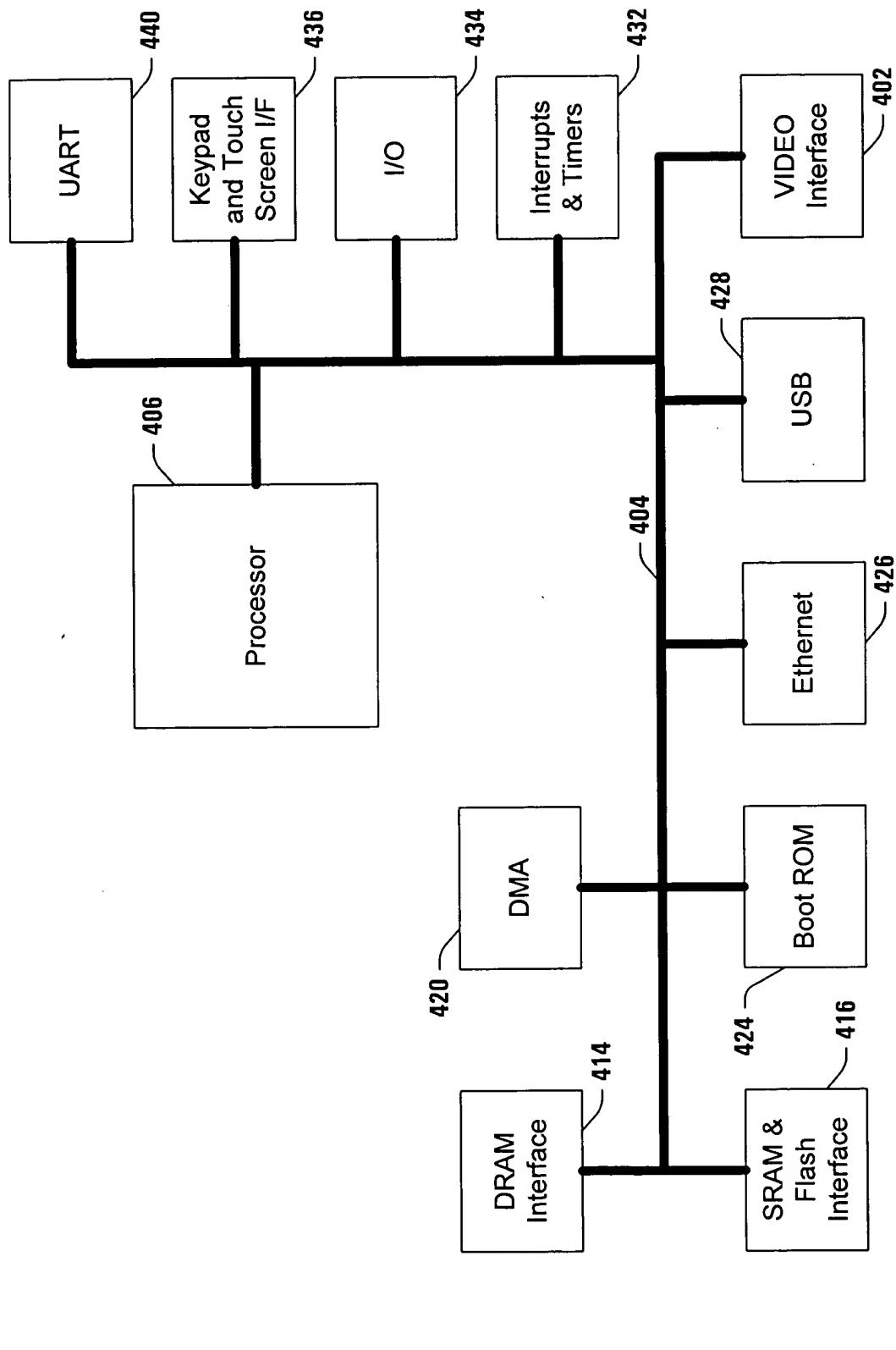
0	0	1	1
1	0	0	1
1	0	0	0

FIG. 29

FIG. 30

Display Type	Horizontal Resolution x Vertical Resolution	Video Clock frequency (MHz)	Frame Buffer Storage format	Display Data format	pixels per shift clock	Pixel Shift Clock frequency (MHz)	Vertical Frame Rate (Hz)
VFD	128 x 32	2	4 bpp	monochrome	8	0.25	400
LCD	128 x 64	2	4 bpp	monochrome	4	0.5	230
LCD	256 x 128	2	4 bpp	monochrome	4	0.5	60
"QVGA" TFT LCD	320 x 234	6.4	8 bpp	analog	1	6.4	80
QVGA STN LCD	320 x 240	4	4 bit RGB	4 bit RGB	1	4	50
HVGA STN LCD	640 x 240	8	4 bit RGB	4 bit RGB	1	8	50
"VGA" DC Plasma	640 x 400	16	4 bpp	monochrome	4	4	60
VGA EL	640 x 480	24	4 or 8 bpp	grayscale	8	3	75
VGA STN LCD	640 x 480	24	8 or 16 bpp	18 bit RGB	1	24	75
VGA TFT LCD	640 x 480	24	8, 16, or 24 bpp	18 bit RGB	1	24	75
VGA CRT	640 x 480	25,175	8, 16, or 24 bpp	analog	1	NA	70
VGA CRT	640 x 480	32	8, 16, or 24 bpp	analog	1	NA	85
SVGA TFT LCD	800 x 600	40	8, 16, or 24 bpp	18 bit RGB	1	40	80
SVGA CRT	800 x 600	50	8, 16, or 24 bpp	analog	1	NA	85
XGA TFT LCD	1024 x 768	60	8, 16, or 24 bpp	18 bit RGB	2	30	72
XGA CRT	1024 x 768	75	8, 16, or 24 bpp	analog	1	NA	80
SXGA TFT LCD	1280 x 1024	85	8, 16, or 24 bpp	18 or 24 bit RGB	1	85	60
SXGA CRT	1280 x 1024	110	8, 16, or 24 bpp	analog	1	NA	70
SXGA+ TFT LCD	1400 x 1024	90	8, 16, or 24 bpp	18 or 24 bit RGB	1	90	60
UXGA TFT LCD	1400 x 1050	110	8, 16, or 24 bpp	18 or 24 bit RGB	1	110	70
UXGA TFT LCD	1600 x 1200	135	8, 16, or 24 bpp	18 or 24 bit RGB	1	135	65
UXGA CRT	1600 x 1200	135	8, 16, or 24 bpp	analog	1	NA	60
UXGAW TFT LCD	1900 x 1200	135	8, 16, or 24 bpp	18 or 24 bit RGB	1	135	60
HDTV-2 LCD	1280 x 720	50	8, 16, or 24 bpp	24 bit RGB	1	50	50
HDTV-2 CRT	1280 x 720	66	8, 16, or 24 bpp	analog	1	NA	60
HDTV-4 LCD	1920 x 1080	135	8, 16, or 24 bpp	24 bit RGB	1	135	60
HDTV-4 CRT	1920 x 1080	135	8, 16, or 24 bpp	analog	1	NA	55
QXGA LCD	2048 x 1536	135	4 bpp	monochrome	8	16.875	40
QSXGA LCD	2560 x 2048	135	4 bpp	monochrome	8	16.875	24
QUXGA LCD	3200 x 2400	135	4 bpp	monochrome	8	16.875	17

FIG. 31



**FIG. 32**